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FLOOD INSURANCE STUDY

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VILLAGE OF NEW HAVEN, ILLINOIS

GALLATIN COUNTY

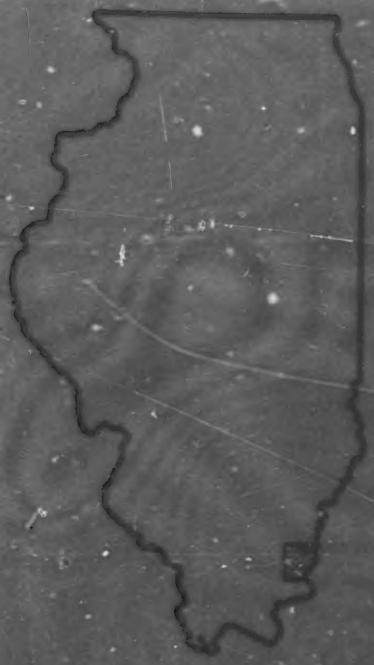

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EXHIBIT

Flood Insurance Rate Map

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FLOOD INSURANCE STUDY

VILLAGE OF NEW HAVEN,
GALLATIN COUNTY,
ILLINOIS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Village of New Haven, Gallatin County, Illinois, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

This Flood Insurance Study was prepared by compiling existing hydrologic and hydraulic technical and scientific data prepared by the Federal Emergency Management Agency (FEMA) for purposes of the National Flood Insurance Program. The data were identified as the best available at the time of compilation of this Flood Insurance Study and should depict the general conditions of the flooding sources with relative accuracy. FEMA performed a cursory review and accepted the data as valid for purposes of this Flood Insurance Study and the National Flood Insurance Program. However, if better information is known to exist or has been developed since the date of this report, the information should be immediately forwarded to the Natural and Technological Hazards Division, Federal Emergency Management Agency, Chicago, Illinois for consideration for revision of this study.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were obtained from the Flood Insurance Study for the Unincorporated Areas of Gallatin County (Reference 1).

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1.3 Coordination

On July 23, 1985, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the community and FEMA.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Village of New Haven, Gallatin County, Illinois. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected based upon the extent and validity of available existing hydrologic and hydraulic data. Flooding caused by overflow of the Ohio River within the corporate limits was studied in detail.

2.2 Community Description

The Village of New Haven is located in the extreme northeastern portion of Gallatin County. The county is located in southeastern Illinois at the confluence of the Wabash and Ohio Rivers. New Haven is bordered by Gallatin County on the south and east, by White and Gallatin Counties on the west, and by White County on the north. State Route 141 serves the village. New Haven has a population of 559, according to the 1980 census (Reference 2).

The climate of the village is typical for the lower Ohio Valley. Within the lower Ohio River basin, the climate varies from moderately warm summers to cool winters. Based on a period of record through 1973, the Evansville Office, National Wealther Service, has reported mean annual rainfall near 41 inches, with yearly totals ranging from about 26 inches in dry years to 63 inches in extremely wet years (Reference 3).

Land uses within the Ohio and Wabash flood plains are largely agricultural with some scattered residential use.

2.3 Principal Flood Problems

The main flood season for the Ohio River basin is the period extending from January through April. Flooding results from extended periods of rainfall typical of winter storms with contributions from snowmelt in various amounts (Reference 1).

Records of damaging floods in this area began as early as 1884. In this century, devastating floods of March 1913, January 1937, March 1945, March 1950, and March 1964 have ravaged the Ohio River basin causing great economic losses and considerable loss of life. The January 1937 flood was the worst flood disaster ever experienced on the Ohio River in this area. No recurrence interval information is available on these floods.

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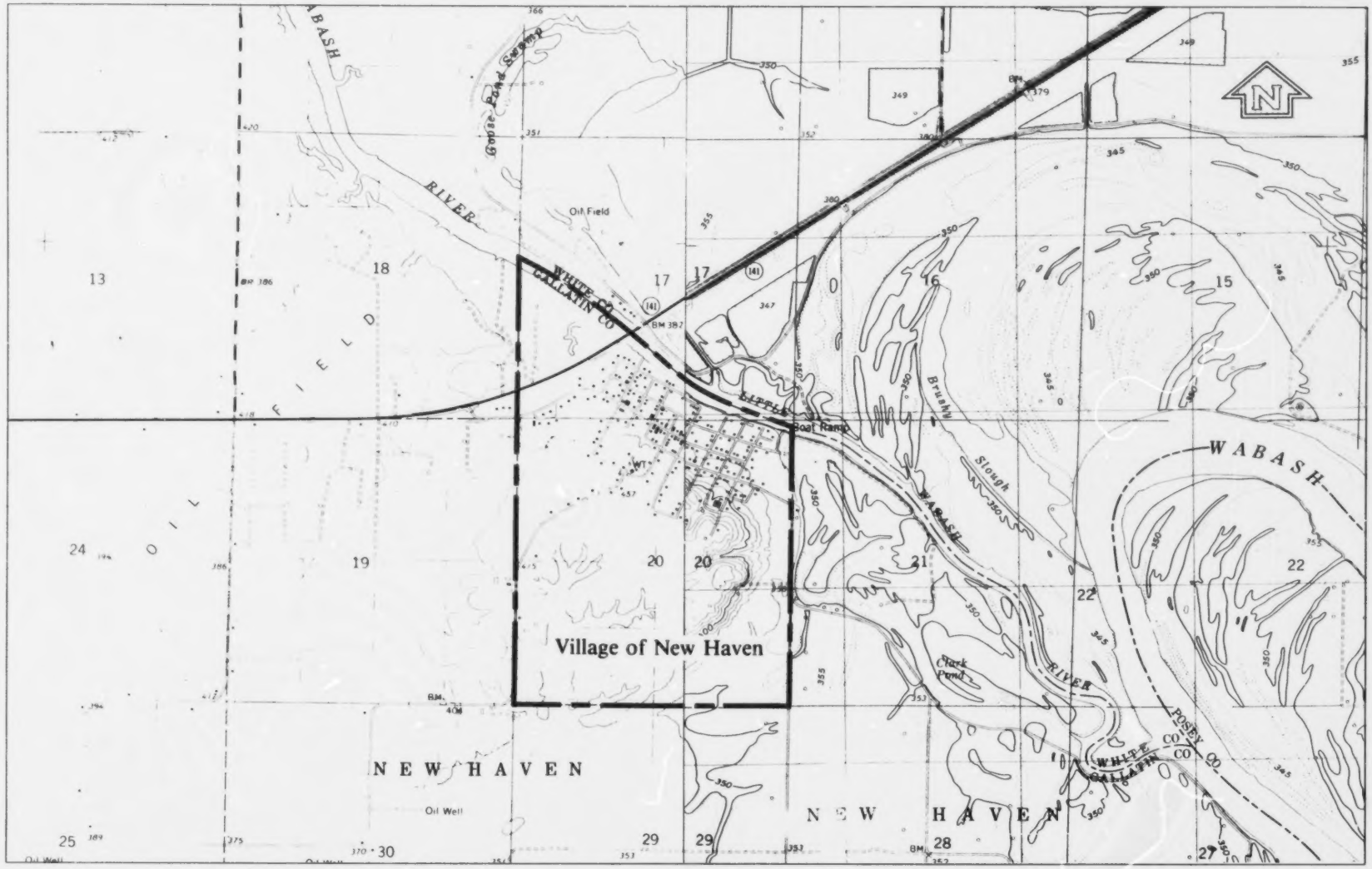

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF NEW HAVEN, IL

(GALLATIN CO.)

APPROXIMATE SCALE

0.5 0 0.5 1.0 1.5 MILES

VICINITY MAP

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2.4 Flood Protection Measures

Due to the parameter of this existing data study, information regarding flood protection measures in the community is obtained only from the source report (Reference 1) and any other readily available sources. None of these sources provided information relating to the flood protection measures in the community.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

Discharge-frequency data for the Ohio River were supplied by the U.S. Army Corps of Engineers (COE), Ohio River Division office. Natural maximum annual frequency curves were developed by the COE in accordance with "Statistical Methods in Hydrology" (Reference 4).

To determine modified flood peaks on the Ohio River, 12 historical floods, in addition to 3 hypothetical ones of greater magnitude, were used in the analyses of flow modification. The flows of these 15 floods, considered representative of the basin, were modified by the operation of COE reservoirs, completed or under construction.

To determine the effect of the combination of reservoirs on tributary or main stem flow, stream regulation studies and system analyses are required. The COE reservoirs have been studied, but impoundments operated by others were not considered, with the exception of the Tennessee Valley Authority.

A method of determining the effect of impoundments on floodflows is by reservoir holdout. Floodflows of a natural hydrograph and a hydrograph resulting from the reservoir modifications are routed downstream. The

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reason for this is to determine the lowering of crest discharge due to storage effects using the standard methods explained in COE EM 1110-2-1408 (Reference 3). This is generally simpler than routing the modified hydrograph that must be combined with tributary inflow. The routing of floods and reservoir holdouts, programmed on an electronic computer by the COE, Ohio River Division, was used for this study (Reference 3).

Frequency curves for the reservoir modified discharges were developed for 20 locations on the main stem of the Ohio River. The discharges in the following table are at the nearest gage to the particular study location.

Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
OHIO RIVER					
Lock and Dam No. 50 (river mile 876.5)	143,400	857,000	1,063,000	1,148,000	1,350,000

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

The hydraulic behavior of the Little Wabash River within the corporate limits of New Haven is dominated by the Wabash River, which in turn is dominated by the Ohio River. Higher flood stages on the Ohio River create a backwater on the Wabash River that extends as much as 25 miles upstream.

The 10-, 50-, and 100-year flood elevations of the Ohio River were taken from the COE January 1981 water-surface profiles, which reflect the reductions of flow provided by upstream reservoirs. For purposes of this Flood Insurance Study, the flood of January 1937 is considered similar to the 500-year flood in magnitude, and is shown as the 500-year flood.

Water-surface elevations of floods of the selected recurrence interval were developed using rating curves, historical data, and step-backwater computer models in an iterative process (References 3 and 5).

Flood elevations for the Ohio River are shown in Table 2, Summary of Elevations.

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TABLE 2 - SUMMARY OF ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (FEET) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
OHIO RIVER at mouth of Wabash River	361.2	366.9	369.0	375.9

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations shown are, thus, considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing flood plain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year flood plain boundaries have been delineated using the flood elevations determined at each cross section. The boundaries were interpolated using topographic maps at a scale of 1:24000 and a contour interval of 10 feet (Reference 6).

Flood plain boundaries are indicated on the Flood Insurance Rate Map. On this map, the 100-year flood plain boundary corresponds to the boundary of the areas of special flood hazards (Zone A and numbered A zones) and the 500-year flood plain boundary corresponds to the boundary of areas of moderate flood hazards (Zone B). In cases where the 100- and 500-year flood plain boundaries are close together, only the 100-year flood plain boundary has been shown. Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights.

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No floodway has been computed for the Village of New Haven due to lack of floodway analysis information.

5.0 INSURANCE APPLICATION

To establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail affecting the Village of New Haven.

5.1 Reach Determinations

Reaches are defined as sections of flood plain that have relatively the same flood hazard, based on the weighted average difference in water-surface elevations between the 10- and 100-year floods. This difference may not have a variation greater than that indicated in the following table for more than 20 percent of the reach:

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the riverine flooding sources of the Village of New Haven are summarized in Table 3, Flood Insurance Zone Data.

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

The FHF for a riverine reach is the weighted average difference between the 10- and 100-year flood water-surface elevations rounded to the nearest 0.5 foot, multiplied by 10, and shown as a 3-digit code. For example, if the difference between elevations is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference is greater than 10.0 feet, it is rounded to the nearest whole foot.

5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique zone number is associated with each possible FHF and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

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Zone A16:	Special Flood Hazard Areas inundated by the 100-year flood, with base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- and 500-year floods by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and, areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding; not subdivided.

Flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community are summarized in Table 3, Flood Insurance Zone Data.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Village of New Haven is, for insurance purposes, the principal product of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines for riverine flooding sources show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the National Flood Insurance Program.

6.0 OTHER STUDIES

This study is in agreement with the Flood Insurance Studies for the Unincorporated Areas of Gallatin and White Counties (References 1 and 7).

The COE, Louisville District, has published a Flood Plain Information report on the Little Wabash River (Reference 8). The COE report shows flood elevations that are not in agreement with those shown in this study. The COE report considered freeflow conditions to be dominant on the Wabash River in the area of the mouth of the Little Wabash River, while this study considered the area to be under backwater from the Ohio River. Therefore, this Flood Insurance Study supersedes the COE Flood Plain Information report.

Due to its more detailed analysis, this Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for the Village of New Haven (Reference 9).

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FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (FEET NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
OHIO RIVER							
REACH 1	0001	−7.8	−2.1	6.9	080	A16	369

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF NEW HAVEN, IL
(GALLATIN CO.)

FLOOD INSURANCE ZONE DATA

OHIO RIVER

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7.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 300 South Wacker Drive, Chicago, Illinois 60606.

8.0 REFERENCES AND BIBLIOGRAPHY

1. Federal Emergency Management Agency, Flood Insurance Study, Gallatin County, Unincorporated Areas, Illinois, February 1984.

2. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Illinois, Washington, D.C., February 1982.

3. U.S. Army Corps of Engineers, Ohio River Division, Ohio River Basin Comprehensive Survey, Appendix C, "Hydrology", Cincinnati, Ohio, August 1966.

4. ————, Sacramento District, Office of the Chief, Statistical Methods in Hydrology, Leo R. Beard, July 1952 and January 1962.

5. ————, Ohio River Division, Ohio River Profiles, Cincinnati, Ohio, January 1981.

6. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 10 feet: New Haven, Illinois, 1964.

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8. U.S. Army Corps of Engineers, Louisville District, Little Wabash River, New Haven, Illinois, Flood Plain Information (Floodway Delineation), November 1983.

9. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Village of New Haven, Gallatin County, Illinois, January 1974.

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